

A Retrospective Investigation of Safety and Efficacy from Increasing Concentrations of Local Anesthetic in Pediatric Femoral Nerve Blocks

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I. Objectives

The purpose of this study is to retrospectively compare perioperative pain relief and safety in pediatric patients who have received a femoral nerve block with varying concentrations of local anesthetic.

II. Background and Rationale

The assessment and management of post-operative pain in the pediatric population can be challenging, and as many studies indicate, remains suboptimal and poorly controlled.¹⁻² As a result of the introduction of nerve localization under ultrasound guidance, regional anesthetic techniques have gained popularity as a method to improve pain management in the pediatric population undergoing orthopedic procedures. The use of a femoral nerve block, in both adults and children for orthopedic surgery, has been well documented as a method to reduce the use of intravenous opioids.³⁻⁸

Prior to the use of ultrasound imaging for regional anesthesia, many providers were reluctant to perform peripheral nerve blocks in the pediatric population. Regional techniques utilizing landmarks or nerve-stimulation methods were typically avoided in infants and children due to the difficulty in targeting neural structures that are often in close proximity to critical structures, the need for sedation or general anesthesia which can potentially mask complications, and the need to use small volumes of local anesthetic to avoid toxicity resulting in inadequate block coverage.⁹ Multiple publications exist describing the optimal concentration and volume of local anesthetic for ultrasound-guided peripheral nerve blocks in adults; however, few studies have been conducted in the pediatric population.^{10,11} The optimal concentration of local anesthetic for peripheral nerve blocks in children remains to be elucidated.

III. Procedures

A. Research Design

This study is a retrospective chart review of pediatric patients undergoing femoral nerve blocks. With a change of practice for femoral nerve blocks in our pediatric patients, we transitioned to an increased concentration of local anesthetic from 0.2% ropivacaine to 0.5% ropivacaine. In performing this transition we would like to evaluate block effectiveness including percentage of patients discharged home as well as safety profile.

B. Sample

Sample size will be a result of available charts from a 5-year retrospective review.

Inclusion criteria:

ASA physical status I or II

Age \leq 18 years of age at the time of FNB

FNB performed from January 1st, 2010- March 31st, 2015

Exclusion criteria:

ASA physical status > II

Co-morbid diseases (cardiac, pulmonary, neurological disease)

Adjunctive medications used in FNB (except for epinephrine) such as dexamethasone

C. Measurement / Instrumentation

Primary Endpoints:

Concentration of local anesthetic injected for FNB

Total milligrams of local anesthetic injected for FNB

Intra-operative opioids administered

Post-operative opioids administered

Intraoperative or Postoperative complications

Secondary Endpoints:

Post-operative pain scales (if charted)

Time to discharge from PACU

Time to discharge from hospital

Disposition: discharge versus inpatient

Number of patients requiring readmission or emergency department visits for post-operative pain

D. Detailed study procedures

After approval of the Internal Review Board, we will begin the described chart review. We will select all patient charts who underwent a femoral nerve blocks from 2010-2015 utilizing our EMR - *PICIS*. From this group we will exclude any charts which are disqualified due to our exclusion criteria and include only the charts that fall within our inclusion criteria.

Next, we will extract the specifics of the femoral nerve block, including local anesthetic concentration and volume as well as any complications. In addition we will extract intraoperative opioid consumption as well as post-operative opioid requirements in the post-anesthesia care unit and phase II of recovery. When available, we will record post-operative pain scales (as a median and mean) of patients undergoing femoral nerve blocks. Also, we will extract time to discharge from PACU and from hospital and if the patients were admitted or discharged. Complications will be recorded, including, but not limited to, post-operative nausea/vomiting requiring admission, local anesthetic toxicity, opioid overdose requiring cardiac or respiratory support or naloxone administration.

E. Internal Validity

This is a retrospective chart review. There are no internal validity measures that correspond with a prospective, blinded or randomized study.

F. Data Analysis

We will utilize an unpaired t-test to compare demographic data in our patient population; it will be expressed as means \pm SD. A Mann-Whitney two-sample comparison will be used to analyze the intraoperative narcotics, post-operative narcotics and time to discharge. The non-arithmetic data (pain scores, etc.) are described as mean and medians with a range.

IV. Bibliography

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